II. REMARKS

Claims 1-46 are pending. The Applicant's attorney has amended claims 1, 5, 8, 16-17, 21, 24, 28-30, and 37 and has added new claims 45-46. But the amendments to claims 8, 17, and 21 do not narrow these claims. In light of the following, all of the claims as amended are now in condition for allowance, and, therefore, the Applicant's attorney requests the Examiner to withdraw all of the outstanding rejections.

Amendments to the Specification

The Applicant's attorney has amended the specification to correct typographical errors, but these amendments add no new matter to the patent application.

Rejection of Claims 1-15 and 24-36 Under 35 U.S.C. § 102(e) As Being Anticipated By U.S. Patent 5,793,435 to Ward et al.

As discussed below, the Applicants' attorney disagrees with this rejection.

Claim 1

Claim 1 as amended recites a processor operable to determine a direction of an edge that includes an original pixel of an original video image and to generate an initial pixel-value component from the value of the original pixel by executing an algorithm that corresponds to the direction of the edge.

For example, referring to FIGS. 4, 7, and 18A and Table 1 (pp. 26-27) of the patent application, a processor 56 determines a direction 45°-225° of an edge that includes an original pixel (P_{24}, P_{42}) of an original video image, field E0. The processor 56 then generates an initial spatial pixel-value component P_{s33} from the value of the original pixel (P_{24}, P_{42}) by executing the algorithm $P_{s33} = (P_{24} + P_{42})/2$, which corresponds to the direction 45°-225° in Table I. The processor 56 then combines the spatial component P_{s33} with a corresponding temporal pixel-value component P_t per equation (32) (p. 28) to generate a filler pixel P_f. Next, the processor 56 combines the filler pixel P_f with the pixels of the original field E0 to form a progressive (non-interlaced) video frame.

In contrast, Ward does not disclose determining a direction of an edge that includes an original pixel of an original video image or generating an initial pixel-value component from the original pixel by executing an algorithm that corresponds to the direction of the

edge. Referring, *e.g.,* to column 5 lines 12-36, although Ward mentions edge detection (line 26) and generating an index signal based on edges (line 16), Ward is silent regarding determining the direction of an edge or generating an initial pixel-value component from an original pixel included in the edge using an algorithm that corresponds to the direction of the edge.

Claims 2-7

These claims are patentable by virtue of their dependencies on claim 1.

Claim 8

Claim 8 as amended recites a processor operable to generate a motion value for a first filler video image from the values of original pixels of first and second original video images, and operable to cause the motion value to indicate motion for a predetermined number of filler video images following the first filler video image if the motion value indicates motion with respect to the first filler video image.

For example, referring to FIGS. 4, 7, 9, and 10 and equations (1) and (5) (pp. 12-13) of the patent application, a processor 56 generates a motion value FM_{01} (FIG. 9) for a pixel block 80 (FIG. 7) of a first filler video field from the values of pixels P_{01}, P_{02}, P_{03}, P_{04}, P_{21}, P_{22}, P_{23}, and P_{24} of a first original even video field E0 and from the values of pixels P'_{01}, P'_{02}, P'_{03}, P'_{04}, P'_{21}, P'_{22}, P'_{23}, and P'_{24} of a second original even video field E1. A nonzero value for FM_{01} indicates motion between the fields E0 and E1, and thus indicates motion with respect to the first filler video field, which the processor 56 will merge with E0 to form a non-interlaced video frame. If FM_{01} indicates motion, then the processor 56 sets the corresponding motion-trace value MT_{01} (FIG. 10) to 5 such that FM_{01} indicates motion for at least the 5 filler video fields following the first filler video field. Specifically, referring to the flow chart of FIG. 16, the processor 56 recalculates FM_{01} for each subsequent filler video field. If the recalculated FM_{01} is less than the current FM_{01}, then the processor 56 retains the current FM_{01} in the memory 90 and decrements MT_{01} by 1. If the recalculated FM_{01} is greater than or equal to the current FM_{01}, then the processor 56 retains the recalculated FM_{01} in the memory 90 and resets MT_{01} to 5. If MT_{01} ever reaches zero, then the processor 56 sets FM_{01} to zero. Therefore, setting MT_{01} to 5 guarantees that FM_{01} will indicate motion for at least 5 subsequent filler video fields. This improves the quality of the

subsequent filler video fields by causing the processor 56 to consider recent motion when generating filler video fields.

In contrast, Ward does not disclose generating a motion value for a first filler video image and causing the motion value to indicate motion for a predetermined number of filler video images following the first filler video image. Referring, e.g., to FIG. 1, although Ward discloses generating a motion value M, Ward does not teach causing the motion value M or the coefficients *c* (FIG. 2) to indicate motion for filler video images following the filler video image for which M/c were calculated.

Claims 9-15

These claims are patentable by virtue of their dependencies from claim 8.

Claim 24

Claim 24 as amended is patentable for reasons similar to those discussed above in support of the patentability of claim 1.

Claims 25-30

These claims are patentable by virtue of their dependencies from claim 24.

Claim 31

Claim 31 as amended is patentable for reasons similar to those discussed above in support of the patentability of claim 8.

Claims 32-36

These claims are patentable by virtue of their dependencies from claim 31.

Rejection of Claims 16-23 and 37-44 Under 35 U.S.C. § 103(a) As Being Unpatentable Over Ward In View Of U.S. Patent 5,920,356 Gupta et al.

As discussed below, the Applicants' attorney disagrees with this rejection.

Claim 16

Claim 16 as amended recites a processor operable to generate direction values for a filler pixel of a filler video image and to generate an initial value for the filler pixel based on the direction values.

For example, referring to Table I (pp. 26-27) and FIGS. 4 and 17-18E of the patent application, in one embodiment a processor 56 (FIG. 4) generates from pixels P_{22}, P_{23}, P_{24}, P_{42}, P_{43}, and P_{44} (FIGS. 7, 17) of an original video field E0 (FIG. 7) five direction values $DV_{44\text{-}225}$, $DV_{63\text{-}243}$, $DV_{90\text{-}270}$, $DV_{117\text{-}297}$, and $DV_{135\text{-}315}$ (col. 2 of Table I) for a filler pixel P_{33} (FIG. 17) of a filler video field. The direction values DV correspond to five possible edges (col. 1 of Table I and FIGS. 18A-18E) that include the filler pixel P_{33}. The processor 56 then compares the lowest of the five direction values DV to an empirically determined threshold T_{edge}. If the lowest direction value DV is less than or equal to T_{edge}, then the processor 56 calculates a spatial component P_{s33} of the filler pixel P_{33} from the original pixels that lie along the edge corresponding to the lowest direction value DV. For example, if $DV_{45\text{-}225}$ (col. 2, row 1 of Table I) is the lowest direction value and is less than or equal to T_{edge}, then the processor 56 calculates P_{s33} from the original pixels P_{24} and P_{42}, which lie along the 45°-225° edge (the edge corresponding to $DV_{45\text{-}225}$). Specifically, the processor 56 calculates $P_{s33} = (P_{24} + P_{42})/2$. But if the lowest direction value is greater than T_{edge}, then the processor 56 calculates P_{s33} from the original pixels P_{23} and P_{43} ($P_{s33} = (P_{23} + P_{24})/2$), which lie along the default 90°-270° edge — the processor also calculates P_{s33} in the same manner if DV90°-270° is the lowest direction value and is less than T_{edge}. After calculating P_{s33}, the processor 56 calculates a temporal component P_{t33} of the filler pixel P_{33}, and, referring to equation (32) on p. 28, calculates a value P_{f33} of the filler pixel P_{33} from a weighted average of P_{s33} and P_{t33}. Consequently, the processor 56 generates P_{f33} based on the direction values DV for P_{33}.

In contrast, the combination of Ward and Gupta neither discloses nor suggests generating an initial value for a filler pixel based on direction values generated for the filler pixel. As discussed below, this combination at most suggests filtering a previously generated value for a filler pixel based on direction values generated for the filler pixel.

As discussed above in support of the patentability of claim 1 and as implied by the Examiner, referring, *e.g.,* to column 5 lines 12-36, although Ward mentions edge detection (line 26) and generating an index signal based on edges (line 16), Ward is silent regarding

direction values of an edge containing a filler pixel, and is, therefore, silent regarding generating an initial value for a filler pixel based on such direction values.

And although Gupta discloses generating direction values for a pixel, Gupta merely discloses using these direction values to filter an existing pixel value, and not to generate an initial pixel value. Referring, *e.g.,* to cols. 1-5, Gupta generally discloses filtering pixels of an existing image to remove visual artifacts from the image. That is, before one can filter the pixels using Gupta's techniques, he/she must first generate the initial values of the pixels, for example, by decoding an encoded image using a decoding algorithm such as the inverse discrete-cosine transform. Referring to columns 18-19, Gupta analyzes each of these initial pixel values, and, for each pixel, generates four pixel-texture estimators (direction values) Tk, one for each of four edges that may pass through the pixel. From the estimators Tk, Gupta determines whether a pixel lies on an edge. If a pixel lies on an edge, then Gupta does not filter the value of the pixel to preserve the sharpness of the edge. If the pixel does not lie on an edge, then Gupta may filter the value of the pixel to reduce artifacts present in the decoded image.

Consequently, the combination of Ward and Gupta at most suggests generating a filler video field per Ward, combining the filler field with an original field to generate a progressive (deinterlaced) video frame per Ward, and then filtering the previously generated pixels of the progressive frame based on Gupta's pixel-texture estimators Tk.

Claims 17 and 19-23

These claims are patentable by virtue of their dependencies from claim 16.

Claim 18

This claim is patentable by virtue of its dependency from claim 16 and also because it recites five direction values, whereas Gupta discloses only four possible edge directions (Gupta, col. 18, line 40).

Claim 37

Claim 37 as amended is patentable for reasons similar to those discussed above in support of the patentability of claim 16.

Claims 38 and 40-44

These claims are patentable by virtue of their dependencies from claim 37.

Claim 36

This claim is patentable by virtue of its dependency from claim 37 and also because it recites five direction values, whereas Gupta discloses only four possible edge directions (Gupta, col. 18, line 40).

Conclusion

In light of the foregoing, claims 2-4, 6-7, 9-15, 18-20, 22-23, 25-27, 31-36, and 38-44 as previously pending, claims 1, 5, 8, 16-17, 21, 24, 28-30, and 37 as amended, and new claims 45-46 are in condition for allowance, which is respectfully requested.

In the event additional fees are due as a result of this amendment, payment for those fees has been enclosed in the form of a check. Should further payment be required to cover such fees you are hereby authorized to charge such payment to Deposit Account No. 07-1897.

If the Examiner believes that a phone interview would be helpful, he is respectfully requested to contact the Applicant's attorney, Bryan Santarelli, at (425) 455-5575.

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Respectfully Submitted,

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